SECTION 27 1500.18

PROTECTED TRANSMISSION SYSTEM ROUGH-IN

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LANL MASTER SPECIFICATION

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the ESM Electrical POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Delete information within “stars” during editing.

Specification developed for ML-3 projects. For ML-1 / ML-2, additional requirements and QA reviews are required.

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Protected transmission system (PTS) rough-in to serve the secure communications areas in the building as indicated on the Drawings.

1.2 LANL FURNISHED EQUIPMENT FOR CONTRACTOR INSTALLATION

A. Fiber-optic cable required to connect PTS outlets.

B. PTS outlet boxes.

C. Fiber-optic backbone cables.

1.3 LANL-FURNISHED AND INSTALLED EQUIPMENT

A. PTS outlet/connectors.

B. PTS patch panel racks.

C. Fiber-optic entrance cable.

1.4 LANL PERFORMED WORK

A. Perform a comprehensive visual inspection of all PTS raceways before they are covered. Coordinate inspection with the LANL PTS Site Manager.

B. Terminate PTS cables.

C. Test terminated PTS cables.

1.5 QUALITY ASSURANCE

A. Comply with the National Electrical Code (NEC) for components and installation.

B. Provide products that are listed and labeled by a Nationally Recognized Testing Laboratory (NRTL) for the application and environment in which installed.

C. Conform to the requirements of the following telecommunications standards:

1. Department of Energy Publication, Telecommunications Security Manual (DOE M 200.1-1), USDOE (OUO) March 15, 1997.

2. LANL PTS Master Plan, latest version.

3. ANSI/TIA/EIA-568-B, Commercial Building Telecommunications Cabling Standard.

4. ANSI/EIA/TIA-569, Commercial Building Standard for Telecommunications Pathways and Spaces.

5. ANSI/EIA/TIA-606, Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings.

6. ANSI/TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications.

D. Qualifications of the fiber-optic cable installers:

1. Certification as BICSI Installer Level II or equivalent training and certification from the manufacturer of the cable/connectors stating that the individual is trained to install fiber-optic cable.

2. Recognized manufacturers, distributors, and industry certifiers include: Anixter, Belden, Systimax, and BICSI.

3. Security clearance requirements:

a. With approval from LANL PTS Site Manager, “UNCLEARED” personnel may perform the following PTS system work in new buildings: mounting POBs, placing conduit, and pulling fiber cable.

b. “UNCLEARED” personnel must be accompanied by escorts if work is in a Security Area.

c. PTS fiber termination and testing will be performed by LANL “Q”-CLEARED personnel only.

d. If the fiber cable is placed by "UNCLEARED" personnel additional testing MUST be performed: The fiber must be OTDR tested twice,

once from each end of the fiber cable, and at each wavelength. Using "UNCLEARED" installation personnel will result in higher costs to the Project for testing.

1.6 SUBMITTALS

A. Submit the following in accordance with Section 01 3300 Submittal Procedures.

1. Within 30 days after Notice to Proceed, submit certifications of the qualifications of the fiber-optic cable installers as described in Paragraph 1.4 of this Section.

2. Submit detailed as-built documents showing outlets, routing and size of raceways, junction boxes, and pull boxes to the Contract Administrator. The LANL Requesting Organization will then submit the as-built documents along with an Enclosure 2, Protected Transmission Systems CDIN/PDS Security Plan to the LANL PTS point of contact. Once PTS security plan approval has been granted by the LANL PTS Site Manager, the LANL Project Leader will inform the contractor when PTS cable installation may begin.

3. Submit as-built records of cable routing in accordance with ANSI/EIA/TIA-606.

1.7 COORDINATION

A. Verify that PTS security plan has been approved by the LANL PTS Site Manager before beginning any PTS system work.

B. Schedule inspections of the PTS raceway system with the LANL Project Leader before covering with building finishes. Coordinate schedule with the LANL PTS Site Manager.

C. Schedule completion of the secure telecommunications (server) rooms to allow not less than 5 working days for the LANL Telecommunications Group to install PTS patch panel racks before the scheduled start of cable installation. Coordinate schedule with the LANL Telecommunications Group.

D. Order PTS outlet boxes and fiber-optic cable from the LANL Telecommunications Group based on actual count, measurement of conduit and wireway runs and required slack cable. Place order at least 10 working days prior to scheduled start of cable installation.

E. Schedule installation of surface mounted PTS outlet boxes and associated surface mounted conduit to start after the completion of application of finishes to walls.

F. Schedule installation of PTS cabling to start after the completion of application of finishes to walls to minimize potential damage to cables.

1.8 RECEIVING, STORING AND PROTECTING

A. Receive, transport, store, and protect, and handle products according to NECA 1 Standard Practices for Good Workmanship in Electrical Construction and NECA/FOA 301.

B. Transport LANL-furnished material and equipment to the jobsite.

PART 2 PRODUCTS

2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

A. Alternate products may be accepted; follow Section 01 2500, Substitution Procedures.

2.2 CONDUIT

A. Use intermediate metal conduit (IMC) with threaded fittings.

B. Minimum conduit size: 1-inch.

C. Refer to Specification Section 26 0533, Raceways and Boxes for Electrical Systems.

2.3 WIREWAY

A. Provide NRTL-listed lay-in wireway, complete with hinged covers, elbows, tees, hangers and fittings required for a complete system.

B. NRTL listing shall include use as equipment grounding conductor

C. Elbow, tee, and cross fittings shall be fabricated with 45 degree segments to accommodate bending radii for fiber optic cables.

D. Supply wireway without knockouts, wing nuts, or clips. Wireway covers must be securely fastened with screws.

E. Supply wireway with inside and outside gray polyester powder finish over a phosphate surface preparation.

F. Manufacturer: Square D “Square-Duct”.

G. For PTS wireway that is not exposed (above the ceiling or underneath the floor), supply tamper-resistant fasteners for assembling the wireway and for securing covers.

1. Use button head “Torx” tamper-resistant cap screws with a solid post in the center.

2. Use conical “Trident” tamper-resistant nuts where located on the outside of the wireway.

2.4 PTS CABLE (LANL-FURNISHED)

A. Cable consists of multiple fibers; cable outside diameter is approximately 0.25”.

2.5 PTS OUTLET BOXES (LANL-FURNISHED)

A. Each PTS outlet will consist of a surface-mounted 8” x 6” x 6” box with lockable, welded hinged cover.

B. LANL will install the fiber-optic connector in the outlet box and will terminate the fibers.

2.6 CROSS-CONNECT EQUIPMENT (LANL-FURNISHED)

A. Cross-connect equipment for PTS fiber-optic cables will consist of patch panel racks that will be furnished and set up by LANL.

B. Fiber optic terminations will be made by LANL.

PART 3 EXECUTION

3.1 EXISTING WORK

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A. When a requirement no longer exists for a PTS, the user will prepare and submit a Request (enclosure 2) to the CCN POC and the PTS Site Manager requesting termination of support.

B. Identify, tag, and remove exposed abandoned PTS system components, including abandoned cable and raceways above accessible ceiling finish. Patch surfaces where removed cables pass through building finishes.

C. Only US Government final cleared, technically competent personnel will install, modify or maintain any portion of an active LANL PTS.

D. Do not leave active PTS infrastructure open and unsupervised during modifications.

1. For existing PTS systems, or for new systems that have been locked, check out and sign for keys daily. At the end of each day all keys must be returned and checked-in.

2. For customer owned PTS systems, the PTS owner will supply keys.

3. For LANL Telecommunications Group owned systems, keys will be supplied by the LANL Telecommunications Group CMC.

4. DO NOT keep keys overnight.

E. Extend existing PTS using materials and methods as specified.

3.2 EXAMINATION

A. Verify interior of building has been protected from weather.

B. Verify that work of other trades likely to damage PTS components has been completed.

C. Examine building finishes that are to receive PTS components and cables for compliance with installation tolerances and other conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

D. PTS device locations and raceway routings shown on Drawings are approximate unless dimensioned.

1. PTS components as required to meet project conditions.

2. Route raceways and cables as required to meet project conditions.

3. Where raceway routing is not shown, and destination only is indicated, determine exact routing and lengths required to meet project conditions. Record actual routing on as-built drawings.

3.3 PTS GENERAL INSTALLATION REQUIREMENTS

A. Verify that PTS security plan has been approved by the LANL PTS Site Manager before beginning any PTS system installation.

B. Install PTS in accordance with the Department of Energy Publication—Telecommunications Security Manual (DOE M 200.1-1), USDOE (OUO) March 15, 1997, and LANL PTS Master Plan. Installation requirement information in these For Official Use Only documents will be available from the LANL PTS Site Manager.

1. PTS raceways above accessible ceilings must meet requirements for type “CDIN-1”.

2. PTS raceways passing through walls must meet requirements for type “CDIN-2.”

3.4 PTS OUTLET INSTALLATION

A. Surface mount LANL-supplied PTS outlets with centers at the following heights:

1. PTS outlets: center 44 inches above the finished floor.

2. PTS outlets at lab benches and counters: center 44 inches maximum above the finished floor. Coordinate locations to be above or completely within, bench and counter backsplashes.

B. Verify location of each PTS outlet by field measurements and coordination with other trades.

1. Install each outlet at a location suitable to serve its intended purpose.

2. Install PTS outlets so they will have 6 inches separation from all other outlets.

3.5 CONDUIT INSTALLATION

A. Install PTS service entrance conduits.

1. Refer to section 33 7119, Electrical Underground Ducts and Manholes, for description.

2. Turn up the secure telecommunications conduits in the main secure telecommunications (server) room in a 24” x 24” x 12” hinged cover box or as directed by LANL Telecommunications Group.

3. Provide a woven polyester pull tape (1200 lb. test) with stamped footage markings into each service conduit and tied off at each end.

B. Install an individual 1-inch conduit for PTS cable from each PTS outlet box to the PTS wireway.

1. Install PTS conduits that will contain only fiber-optic cables so they will have 2 inches separation throughout the conduit route.

2. Locate PTS conduits that are above accessible ceilings 3 inches above the ceiling tiles and below suspended mechanical equipment, piping, ductwork, cable trays, and building structure so they will be easily visible for inspection.

3. Install PTS conduits that will pass through walls without joints or fittings.

4. Surface mount PTS conduits and outlets in offices so they will be inspectable.

5. For penetrations through walls, floors, etc., firestop material must not cover pipe threads. All pipe threads must be visible.

C. Provide a woven polyester pull tape (1200 lb. test) with stamped footage markings in each empty PTS conduit. Do not leave any pull strings hanging out of the PTS anywhere.

D. Use bends on conduits for horizontal cables with a minimum inner edge radius of 5 inches.

E. Do not use conduit bodies for changes in direction or as pull boxes.

F. Provide a woven polyester pull tape (1200 lb. test) with stamped footage markings in each empty PTS conduit. Do not leave any pull strings hanging out of the PTS anywhere.

G. Refer to Section 26 0533 Raceway and Boxes for Electrical Systems for additional installation requirements.

3.6 WIREWAY INSTALLATION

A. Install PTS wireway following the manufacturer's installation instructions and NECA 1, Standard for Good Workmanship in Electrical Construction. Have the manufacturer's installation instructions available at the construction site.

B. Use PTS wireway only in corridors, secure telecommunications rooms, secure server rooms, and vault-type rooms.

C. If permitted by the PTS security plan, PTS wireway may be installed above corridor suspended accessible ceiling.

D. Install PTS wireways with not less than 12 inches above and 12 inches to one side of each wireway to permit access for installing and maintaining cables and for security inspections.

E. Bond each section of the wireway to ensure electrical continuity. Bond the wireway to the secure telecommunications (server) room ground bar with 6 AWG copper conductor.

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Edit the following article to match project requirements.
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F. Extend PTS wireways to patch panel racks in the [secure server room(s)] [secure telecommunications room(s)] [vault-type room(s)]. Coordinate attachments to racks with LANL Telecommunications Group.

G. Support and brace wireway in accordance with Section 16070, Hangers, Supports, and Seismic Protection.

3.7 PTS CABLE INSTALLATION

A. Install LANL-supplied PTS cables according to NECA/FOA 301, Standard for Installing and Testing Fiber Optic Cable (ANSI), the NEC, and requirements in this Section.

B. Handle and install cable according to cable manufacturers' instructions. Have the manufacturer's installation instructions available at the construction site.

C. Completely and thoroughly swab raceways before installing cable.

D. Clean foreign matter from interior of boxes before installing cables.

E. Store cable for 24 hours in the installation area ambient temperature before installing.

F. Do not “through-pull” cables at boxes, fittings or cabinets where a change of raceway alignment occurs.

G. Comply with Article 800 of the NEC.

H. Install ___ (quantity as per performance specification) LANL furnished fiber-optic cable(s) from each PTS outlet to the PTS patch panel racks in the secure telecommunications (server) room. Leave 15 feet of slack at the patch panel end and 4 feet of slack at the outlet end.

I. Fiber optic cables may not be terminated until lock cores are installed in PTS outlet boxes.

3.8 IDENTIFICATION

A. Band PTS raceways, wireways and conduit with 3/4 inch wide red plastic tape on 5 foot centers, beginning with the first band within 2 inches of the POB, on both sides of wall, ceiling and floor penetrations, at every change of direction and within 2 inches of wireway penetration. Apply tape after painting is completed.

B. Positively identify each cable using an approved light source and at both ends using a numbering scheme that complies with ANSI/EIA/TIA-606 and instructions from the LANL Telecommunications Group.

1. Uniquely identify each cable at both ends using a numbering scheme that complies with instructions from LANL Telecommunications Group.

2. Identify PTS cable under provisions of Section 26 0553, Identification for Electrical Systems; use a tag produced using a label-printing machine.

3.9 ACCEPTANCE TESTING

A. Perform a simple light continuity acceptance test on each fiber of installed fiber-optic cables. Replace cables that do not pass acceptance tests.

B. Using continuity tests, verify proper identification of each cable.

3.10 FIELD QUALITY CONTROL

A. PTS raceway system will receive a comprehensive visual inspection by LANL PTS Site Manager before being covered.

B. Correct deficiencies identified by this inspection and arrange for re-inspection.

END OF SECTION

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Do not delete the following reference information:
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FOR LANL USE ONLY

This project specification is based on LANL Master Specification 27 1500.18, Rev. 0, dated January 6, 2006.